FYNBOS FORUM

Programme

Theme : Whither Fynbos Research? Questions and Answers

7-9 June 2000
Ganzekraal Holiday Resort & Conference Centre
Western Cape

Organised by the Inland Resources Programme of the
Sustainable Environment Theme of the
National Research Foundation

NRF

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THURSDAY, 8 JUNE 2000

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16:05-16:20	Conservation status of the Coastal Dune Fynbos plant communities - along a 200km portion of the Garden Route Coastline - *GB Hellström*
16:20-16:35	~~Fynbos rehabilitation as a practical management tool within a golf course, Knysna – *C Avierinos*~~ Cancelled.

16:35-16:50 Shrubland restoration in old fields of the Fynbos Biome - *P Holmes*

16:50-17:00 Poster: Growing Trees and Conserving the Environment: A long term strategy – *K Kirkman*

17:00-17:15 Realities of Fynbos Farming – *M Middelmann*

17:15-19:00 LEISURE TIME

19:00 WEST COAST DINNER
Dinner Speech by Paul Britton

FRIDAY, 9 JUNE 2000

SESSION 2: CONSERVATION & MANAGEMENT (Continue)
(Chairperson : Charlie Boucher)

08:00-08:15 Can an Environmental Management System (EMS) replace the traditional park Management Plan? – *J Jackelman / M Laros*

08:15-08:30 Management of Grootbos Private Nature Reserve - *I Kotzé*

08:30-08:40 Poster: Long term management planning in the Kogelberg Biosphere Reserve – *R Pool*

08:40-08:50 Poster: Fire History of the Fynbos Biome : 1987 – 2000 - *C Burgers / R de Villiers*

08:50-09:05 A conservation plan for the Renosterveld and Sand Plain Fynbos remnants on the West and South Coast areas of the Cape Floristic Region (CFR) – *K Maze*

09:05-09:20 Impact of and possible management options for the eradication of smallmouth blackbass in certain rivers in the Cape Floristic Region – *ND Impson / R Bills*

09:20-09:30 Poster:The African black oystercatcher (*Haemotopyus moquini*) – Indicator species for our coastline - *R Hiseman / J Sharples*

09:30-09:45 Information Management Systems – moving fynbos conservation (reluctantly) into the digital age – *J Jackelman L Gardiner*

09:45-09:55 Poster: Cultivation of primary health care plants associated with the fynbos region – *M Smith / C Coetzee*

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SESSION 3: DEVELOPMENT THREATS
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10:35-10:50 Description of the vegetation in the South Cape District Council area – its role towards spatial framework planning – *K Freckleton / C Avierinos / GB Hellström*

10:50-11:05 Management of large numbers of visitors – *M Slayen*

11:05-11:15 Poster: The impact of groundwater abstraction on springs in the Kammanassie Mountain – *G Cleaver*

11:15-11:30 Does alien vegetation burn with greater severity than fynbos, and how does fire severity influence catchment stability – *D Euston-Brown*

SESSION 4: CAPE PROJECT
(Chairperson : Kristal Maze)

11:30-11:50 A framework for a strategic and systemic conservation plan for the Cape Floral Kingdom : An outcome of the Cape Project – *RM Cowling / RL Pressey / AT Lombard / DM Richardson*

11:50-12:10 The CAPE strategy developed for the conservation of the Cape Floristic Kingdom - *C Gelderblom*

12:10-12:30 Implementation programme for CAPE - *BW van Wilgen*

12:30-13:30 LUNCH

Session 5: MANAGEMENT AND CONSERVATION

(Chairperson : Maryke Middelmann)

13:30-13:45 Review of invasive alien plant control on the Cape Peninsula - *R Ernstzen*

13:45-14:00 Relevance of VEGMAP Project to the Fynbos Biome - *DJ McDonald / C Boucher / L Mucina / E Rode (Presented by C Boucher)*

14:00-14:10 Poster: Protea Atlassing for the future - *T Rebelo*

14:10-14:25 The certification of aqueous smoke extracts used in restoration projects - *M Meets / C Boucher*

14:25-14:35 Poster: Description and analysis of the riparian vegetation types of the Hottentots-Holland Mountains -*EJJ Sieben*

14:35-14:50 Vulnerability of the plant biodiversity of the Fynbos and succulent Karoo Biomes to projected Climate Change - *WJ Bond*

CLOSURE - CHRISTO MARAIS

Paper and Poster Abstracts

NEW CENTURY, NEW ERA IN FYNBOS RESEARCH

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Ecological research in the fynbos thrived under the cooperative science programmes of the late 1970s and 1980s, culminating in the book "The Ecology of Fynbos" published in 1992. Since then, research interest in fynbos ecology has somewhat stagnated, as has published output. There are notable exceptions. The fascinating biology of pollination systems has attracted a number of researchers in the last ten years. There has been excellent work on the systematics, evolution and biogeography of a number of taxa. But we are not doing justice to our famous flora. In this contribution, I suggest a number of topics that need investigation. Some of these, such as climate change, may have large impacts on the future of the biome. I also discuss possible means for stimulating a new era in fynbos research.

RESTIONACEAE : TOWARDS UNDERSTANDING THE BIOLOGY OF THIS FYNBOS FAMILY

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Restionaceae are arguably the most characteristic family in fynbos. Species in this family range from the summit of Seweweekspoort Berg, the highest peak in the Cape Mountains, to the coastal dunes. They are found in Passerina dominated shrublands at the arid edges to the Region, and in the wettest coastal mountains, and from well-drained habitats to stream margins. Possibly due to the difficulty of identifying the species, they have received rather little attention. However, they are immensely diverse both morphologically and biologically.

I will briefly review what we know about the pollination biology, seed dispersal biology, and fire ecology of the species in the family, and attempt to summarise the impacts of these biological attributes on the optimal management strategies. I hope also to demonstrate an interactive identification system for Restionaceae, which is currently under development.

ERICA, THE MOST DIVERSE GENUS IN THE FYNBOS

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Recent research on the family Ericaceae has shown that all the species in southern Africa belong in a single genus, namely *Erica*, which has 760 species (95% of the genus) occurring in the Fynbos Biome. It is by far the largest genus in the biome and also the whole African flora. Many of the species are very distinct whilst others form highly variable complexes; some are widespread but many have highly restricted distributions. New species are being discovered on a regular basis and about 25 await formal description. An understanding of the diversity within this remarkable genus is very important for discussions on the conservation of the Fynbos.

TRADE-OFFS IN THE AMARYLLIDACEAE

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The Amaryllidaceae is a small family of bulbous plants found world wide. Southern Africa, an important centre for the family, has ca. 230 species in 18 genera, most of which are endemic or near endemic to the subcontinent. The Cape Floristic Region has 93 amaryllid species in 16 genera. 56 species are endemic to the Region, mostly on the lowlands, where 35 species are rare and endangered. Of these Red Data taxa, only 8 species are conserved in national, provincial or privately owned reserves. Many of the species that are not formally conserved are currently known from very restricted populations. From

the point of view of species conservation the southern African Amaryllidaceae have several biological features that place them at risk. Many species of Boophone, Brunsvigia and Crinum have large bulbs that take 7 years or more to mature. Flowering, which is delayed to summer or autumn, is opportunistic and often fleeting. Many species are self-sterile and with the exception of Cyrtanthus, the seeds are non-dormant and cannot be stored. Captive plants are susceptible to disease and expensive to maintain, while species grown in close proximity to each other easily hybridise. These features alone are not unique to the southern African Amaryllidaceae but the phylogeny of the petaloid monocotyledons shows that they are uniquely combined in amaryllid lineages which are richly represented in the Cape, namely Haemanthus, Amaryllis, Nerine, Brunsvigia, Crossyne, Hessea, Strumaria, Boophone and Cybistetes. Ironically, these specialised features dispose the species to being overlooked in environmental impact assessments, yet as items for trade the wild plants are eagerly sought out as rarities, ornamentals and medicines. The opportunistic strategies seen in southern Africa's winter-rainfall Amaryllidaceae may have favoured their success during aridification in the past but under the relentless habitat loss of the present these specialisations may now represent 'high risk' traits.

CYCLOPIA LONGIFOLIA – LOST, FOUND, FLOURISHING

Poster

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Cyclopia longifolia (J.R.T. Vogel) (Long leave honeytea) was found by Harry Bolus in January 1867 on 'Van Staaden's River banks' and then disappeared for approximately 130 years until Noel Grey, an amateur botanist from Port Elizabeth, found this species in SAFCOL's Longmore plantation. A few plants were found in a tributary of the Bulk River. After confirmation of the species, he informed SAFCOL of the find. Plans were made with the help of the Nature Conservation Department to ensure that this endangered species do not disappear again.

Some *Acacia longifolia* and *Pinus pinaster* trees growing in the vicinity of the plants were ringbarked and young plants were hand-pulled. Some 40 plants were discovered in the 'Helse kloof' about 5 kilometres away. A research

project by a UPE student on the recruitment of seedlings and to determine whether this species is a resprouter or seeder, was done during September 1996. Four treatments were compared and it was found that, taking into account environmental factors, such as a flood a month after treatment, and treatment considerations (a fire in February would have been preferred but would have been to dangerous for the plantation), seedling recruitment was very low. Adult plants resprouted after the fire as well as in the treatment where plants were hacked.

Since this experiment, follow-up work to treat the invading plants was done and the areas where plants of this species occur were plotted on the GIS [geographical information system] map of Longmore. More plants were also discovered in other rivers, the Geelhoutboom River, the Berg River and a tributary of the Van Stadens River. In all instances the plants do not grow much further than about 5 meters from permanently running water.

FYNBOS LEGUMES – FIRE WEEDS OR LONELY DWELLERS?

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A number of Fynbos endemic legume genera have been categorised using the new IUCN Red List Categories prepared by the IUCN Species Survival Commission in 1994. These new categories have been developed to provide an explicit, objective framework for the classification of species according to their extinction risk. The results of the analysis of the legumes are illustrated and discussed. Problems associated with the application of the categories to species with different survival strategies are highlighted. The need for a special approach for Fynbos taxa is suggested.

HELEOPHRYNE HEWITTI (HEWITT'S GHOST FROG): GHOST HUNTING IN THE EASTERN CAPE

Poster

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Heleophryne hewitti Boycott, 1988 is an endangered frog with a very restricted range on SAFCOL's Longmore plantation. It is known from only four streams, the Geelhoutboom, Martins, Klein and Diepkloof Rivers, in the Elandsberg Mountains. After numerous searches, over many years, in other streams in the vicinity and in adjacent ranges, no other localities apart from the above for rivers, were found. These streams are perennial, swift-flowing with rocky beds and flow mostly through pine forest in a southerly direction.

The frog is up to 50 mm from snout to vent with long hind legs (±75 mm) with friction pads on all fingers and toes. It has a squat build and numerous rounded and irregular shaped dark-brown patches marginated with a fine white line on a light to olive-brown background. The limbs have dark, irregularly shaped transverse bands, lacking the white margin. The fingers have no webbing and the toes are webbed to some extent. The tadpoles are unlike any other South African tadpoles as they have unique suctorial mouths extending right across the ventral surface of the head. Numerous tooth rows can be observed in the mouth. The tadpoles suck to the rocks in the fast flowing streams and can be picked up from the stream still clinging to a rock.

During 1998 a project was launched by SAFCOL to determine the requirements for the conservation of this species. A search of the frog's habitat was done and observations were noted with a GPS (Global Positioning System) to be transferred onto the GIS (Geographic Information System) of Longmore plantation. The influence of the pines on the frog is also being studied. Trees close to or in the streams are ringbarked to kill them and to prevent damage to the streambed and banks. As new information on this frog is gathered, the conservation plans will be adapted to make sure that they will not be a ghost story in future.

HABITAT FRAGMENTATION AND ITS CONSEQUENCES FOR PLANT-POLLINATOR MUTUALISMS IN THE FYNBOS

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South Africa, and in particular the Cape, is world renowned for its high levels of plant diversity and endemicity. Also unique are the very high levels of specialization in plant pollinator relationships. In contrast with the Northern Hemisphere, where specialized pollination systems are rare, fynbos plants often depend on a single pollinator or small group of related pollinators. For this reason, there is concern over the dramatic decline of specialized pollinators in recently fragmented habitats. Results to date suggest that oil-collecting bees and tangle-winged flies are extinct from several small nature reserves, while sunbird diversity and flower visitation rates are also lower than in small reserves. These reserves protect the last remnants of sand plain fynbos and renosterveld and are surrounded by urban sprawl and agriculture. Seed production in plants without pollinators varied from zero in some pollination requiring orchids to 100% in habitually self-pollinating Iridaceae. However, the consequences of decreased seed-set on plant populations are not obvious, because they are determined by the degree to which the plant species depends on seeds for reproduction and persistence. For example, plants that reproduce clonally via underground runners or extra bulbs may persist despite zero seed production, but initial results indicate that these persistent populations experience a loss of genetic diversity. Demographic studies of clonal orchids and non-clonal amaryllids have been initiated to elucidate the real consequences of pollinator extinction for these divergent life histories. The balance of evidence suggests that the conservation of many South African plants depends on the conservation of their pollinators, however, pollinator conservation is hampered by the lack of basic information on pollinator life cycles and nesting requirements.

A NEW INITIATIVE TO STUDY THE SOIL MICROBES OF FYNBOS

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Soil microorganisms play a pivotal role in essential biological processes, such as the mineralisation of organic matter and the biogeochemical cycling of nitrogen and other elements. Some of these life forms are also essential in the degradation of pollutants. However, it is known that pollutants may be detrimental to many soil microbes. Consequently, there is a need to assess the damage to the environment resulting from the inhibition of biological processes by pollutants.

A primary objective of the environmental microbiology research group at the Department of Microbiology, University of Stellenbosch (US), is to study microbial diversity of fynbos soil and to determine the impact of agricultural and industrial activities on these organisms. An interdisciplinary approach has been adopted in this research, since the majority of projects of this nature encompass the study of interactions between soil microorganisms and the chemical and physical environment. Current projects are conducted in collaboration with the Soil Science Research Group at Infruitec-Nietvoorbij, as well as the Department of Soil Science and the Institute of Wine Biotechnology at the US. These projects were designed to facilitate capacity building in methodology of soil microbiology within the research group. For example, a project was launched to search for a series of biological indicators of copper induced stress in fynbos soil. This series of indicators will eventually be adapted to determine the impact of other pollutants on soil health. In another project, the diversity and ecology of saprotrophic soil fungi of fynbos, is studied. Because they have no obvious economic value, these fungi received very little attention from mycologists in the past, and pathogenic and mycorrhizal fungi were mostly studied. Consequently, the impact of many saprotrophic fungal species in fynbos is largely unknown. Our group is also involved in a project that may have far reaching consequences on our views of using genetically modified organisms (GMO's) in industry. In this project the fate of genetically modified wine yeasts is followed in the presence of soil microbes from fynbos. The projects in the research group are being sponsored by the US, the NRF and Winetech.

PSYCHROTOLERANT MUCORALEAN FUNGI PRESENT IN PRISTINE MOUNTAIN FYNBOS SOIL

Poster

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Mucoralean fungi, have been used in biotechnology, studied as agents of post-harvest decay in crops and used as model systems to understand biochemical pathways. However, relatively little is known about the ecology of these fungi in pristine natural environments. Consequently, the natural habitats of these fungi are being investigated to assess the impact of anthropogenic activities on the numbers and diversity of these fungi. The aim of this study therefore, was to determine the psychrotolerant mucoralean fungal diversity in pristine Mountain Fynbos soil from the Jonkershoek Valley. In addition, to assess the impact of agricultural practices on these fungi, their diversity was determined in vineyard soil from the same geographical region. A standard enumeration method, the soil plate technique, was used to determine the psychrotolerant mucoralean fungal diversity in the soil samples. The soil samples were analyzed in mid-summer and mid-winter. The total number of psychrotolerant mucoralean fungi per gram soil in mid-summer, as determined by using soil plates and an incubation temperature of 4^0C, was 6.0×10^2 CFU/g soil in the pristine Mountain Fynbos soil and 2.0×10^3 CFU/g in the vineyard soil. In mid-winter the number of psychrotolerant mucoralean fungi in the pristine Fynbos soil increased to 1.3×10^3 CFU/g soil, while the number in the vineyard soil remained similar (1.7×10^3 CFU/g). In mid-summer the genus *Mortierella* subgenus *Mortierella* was the only detectable mucoralean genus in the pristine Fynbos soil, while *Absidia*, *Actinomucor*, *Mortierella* subgenus *Mortierella*, *Mortierella* subgenus *Micromucor* and *Rhizopus* were found in the vineyard soil. In mid-winter the genera *Absidia* and *Mortierella* subgenus *Mortierella* were found in the pristine Fynbos soil, while *Cunninghamella*, *Mucor* and *Rhizomucor* were found in the vineyard soil. The results of this study indicate that the diversity of the psychrotolerant mucoralean genera was higher in the vineyard soil than in the pristine Mountain Fynbos soil. This may be as a result of psychrotolerant mucoralean fungi being introduced to the soil through agricultural practices.

THE IMPACT OF COPPER ON MICROBIAL POPULATIONS PRESENT IN FYNBOS SOIL

Poster

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Copper that is administered to vines as a component of fungicides may eventually end up in soil of nearby fynbos. Consequently, the impact of copper on soil microorganisms originating from fynbos was investigated in this study. Changes in selected microbial communities in a series of soil microcosms challenged with different copper-oxichloride concentrations were monitored. The series consisted of soil that received the following amounts of copper (ppm): 0 (control), 10, 20, 30, 40, 50, 100. Microbial communities monitored as colony forming units on microbiological media over a five week period included the following: 1) total fungi, 2) basidiomycetous and lipomycetaceous yeasts, 3) psychrotolerant fungi and 4) total bacteria and actinomycetes. The copper concentrations had no significant impact on the numbers of total fungi and psychrotolerant fungi present in the soil. After two days of incubation, the number of basidiomycetous and lipomycetaceous yeasts in the soil receiving copper were lower than in the control. These numbers however, were similar after seven days of incubation. Although the total number of bacteria remained similar, a shift in the dominant bacterial species followed exposure to copper. There were also significant differences in the whole-community metabolic profiles of communities exposed to copper and the untreated controls. During the second part of the study selected microbes, which were exposed to elevated copper concentrations in the soil, were again challenged with copper to determine the level of copper resistance in these organisms. Fungi isolated from soil containing lower copper concentrations (10 to 30 ppm Cu) were generally less tolerant to higher copper concentrations in agar plates (50 and 100 ppm Cu) than those that were isolated from soil containing higher concentrations (40, 50 and 100 ppm Cu). Using flow cells combined with fluorescent viability probes it was shown that the bacterial community also developed increased resistance following copper exposure. It is likely that this resistance is the result of changes in community composition, as was indicated by the culturing experiments.

IN VITRO PROPAGATION OF INDIGENOUS BULBS

Poster

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Indigenous bulbs, using leaves or twin scales, are propagated in glass containers on an appropriate growth medium under sterile conditions. Such plants are disease free, multiply rapidly, while e.g. colour variations are propagated vegetatively. The purpose of the programme is two fold i.e. training students and providing material to the industry. The latter would include public gardens, private persons and also rehabilitation programmes in nature reserves.

BENEFIT SHARING FROM THE COMMERCIALISATION OF NATURAL PLANT PRODUCTS

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Benefit sharing has been emphasised by the Convention on Biological Diversity (CBD). According to the CBD, access to genetic material for bioprospecting shall be subject to Prior Informed Consent (PIC), and a Material Transfer Agreement (MTA) which spell out the principle of benefit sharing.

International companies involved in commercializing of genetic material, in principle accepted the complex issue of benefit sharing . In South Africa, benefit sharing models on ornamental genetic material exists, but no models are at present in place for Natural Plant Products (NPP). Due to the fact that many NPP are already in the public domain, it is difficult to ensure that the original custodians of indigenous knowledge systems share in the financial gain from commercial exploitation.

To obtain meaningful advantage from biodiversity, it is necessary for all the role players to understand the concept of benefit sharing and commercialisation .

INCENTIVES FOR PRIVATE CONSERVATION: WHERE TO FROM HERE?

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This paper will outline the current situation of off-reserve conservation in the lowlands of the Cape by understanding the mindset of Landowners with regard to legislative hurdles and the absolute lack of inducements for proper conservation land management. The growing volume of laws curtailing a farmer's freedom, coupled with a poor understanding of conservation goals and ineffectual communication by extension workers leads to a decidedly conservation-unfriendly atmosphere. Any analysis would show that sufficient legislation exists (or will soon be enacted) to prosecute poor land management and by far the missing ingredient is correctly devised incentives to encourage private conservation. Although environmental policy is full of the use of incentives, nothing has yet been forthcoming from Government.

Before getting the policy mix on incentives and penalties right, we must be explicit about what we are trying to achieve. We don't need more Game Farms, but the majority of South African veld types are seriously underrepresented in the conservation network. Crucial ecological and evolutionary processes are similarly poorly conserved, because our focus has been on animals, not biodiversity.

What we could do to offer real practical incentives is to use new tax systems to offer rebates targeted at specific areas/habitats, if managed for conservation. Secondly, simplify and clarify options for private conservation and civic bodies. At present over 20 designations for private land and 4 overlapping public forums (WUAs, FPAs, SCC's, Conservancies *etc*). These new categories would have to be supported by dedicated extension personnel, and form part of a Biodiversity Strategy for South Africa.

CONSERVATION STATUS OF THE COASTAL DUNE FYNBOS PLANT COMMUNITIES ALONG A 200KM PORTION OF THE GARDEN ROUTE COASTLINE

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This 200km length of coastline lies between Mossel Bay in the West and the Keurbooms dunes (Plettenberg Bay) in the east. Approximately 50% of this coastline consists of rocky shores and cliffs, and the remainder sandy beaches and coastal dune systems. Rapid residential and resort expansion within the coastal dune areas has resulted in a marked decrease in the coastal dune fynbos, with, in the best instance, isolated patches of fynbos remaining between developments, and in the worst case, the complete destruction of entire specialised dune communities. 1936 aerial photography was used to map the original extent of the dune fynbos, which was then compared to recent photography. A percentage decrease was calculated. In addition quadrat sampling of the remaining coastal fynbos has enabled an accurate account of the *status quo* of the dune fynbos, together with conservation values of these remaining sites. This presentation is a first attempt at understanding the current status of this vegetation and the impacts causing its decline.

FYNBOS REHABILITATION AS A PRACTICAL MANAGEMENT TOOL WITHIN A GOLF COURSE, KNYSNA

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Fynbos and golf courses are mostly seen as opposite sides of a coin, but can fynbos rehabilitation be successfully used within a golf estate? The Sparrebosch Clifftop and Country Estate in Knysna, is a residential and golf estate set within lowland fynbos, which was previously extensively burnt and utilized for grazing. The development area consisted of 40% of the 254ha site. This 40% includes a 18 hole golf course, with the remaining 60 % of the property to remain as open space. This 60 % consists of both the "no-go areas" (never touched during construction) and the fynbos rehabilitated areas disturbed during construction. All rehabilitation was required to reinstate the fynbos

communities of the site, while at the same time protecting the surface sediments from potential erosion. As the construction process was phased, the simultaneous phased rehabilitation process enabled continual monitoring of the success of the rehabilitation and modification of the rehabilitation methods, to achieve optimal results. Various ages of rehabilitated fynbos areas are now present over the site. The presentation shows the various successes achieved, and highlights some problems with regard to fynbos succession.

SHRUBLAND RESTORATION IN OLD FIELDS OF THE FYNBOS BIOME

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I propose a framework to investigate methods for restoring native vegetation in abandoned agricultural lands of the Fynbos Biome. Old fields generally support transformed vegetation (often alien annuals) as an alternative stable state. Hypotheses centre around altered ecosystem processes and the availability of indigenous propagules (persistence and dispersal).

In most cases lowland or valley bottom sites that were flat enough to permit ploughing, would have supported fire-prone shrublands: Renosterveld on the shales and Fynbos on the neutral to acid sands. Lowland vegetation types in particular are poorly conserved and highly transformed. If practical and cost-effective methods can be found to restore transformed lands to functioning shrubland ecosystems, this will improve the conservation options in the lowlands: it would become viable to include land containing smaller remnants in the conservation network and to improve connectivity by restoring areas between priority sites.

GROWING TREES AND CONSERVING THE ENVIRONMENT : A LONG TERM STRATEGY

Poster

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The South African Forestry Company Ltd. (SAFCOL), commenced business in 1993, after inheriting commercial forests previously managed by the Department of Forestry. Errors were made during afforestation in the past. These wrongs cannot be corrected overnight, but are being addressed systematically over time. Through the implementation of sound environmental management practices SAFCOL is seeking to reduce the impact of its activities on the environment. Responsible environmental management and procedures have become general practice. Biannual environmental auditing and the development of the ISO 14001 environmental management standard are being implemented. The company received international Forest Stewardship Council (FSC) certification in 1998 for all its plantations. The FSC certification provides the company with the means to benchmark its operations against an environmentally accepted standard. Within the company environmental conservation focuses on a number of key goals. Implementation of the ISO 14001 standard, compliance to legal standards, and the management of environmental impacts through impact assessments are included. SAFCOL is committed to managing biodiversity, conserving ecosystems, habitat, species, and archaeological and cultural artifacts on its land. Conservation management planning includes vegetation surveys, soil surveys, GIS mapping and long term planning for the removal of alien vegetation and burning, based on ecological standards. The clearing of wetland and riparian zones is a primary goal. A process of continuous improvement (plan, implement, monitor and review) is ensuring that SAFCOL is able to manage and mitigate the effect of afforestation on the environment, and is ensuring that SAFCOL is playing an increasingly important role in protecting South Africa's natural resources, threatened species and habitats.

REALITIES OF FYNBOS FARMING

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The Fynbos Industry has been identified as a growth sector for the Western Cape, in terms of foreign exchange earnings and job creation. The Industry is also suitable for small farmer development.

There are a number of negative factors which inhibit growth within both the dried and fresh flower sectors:

- world trade constraints (competition, pricing and taste)
- ignorance of sustainable harvesting levels

Nature Conservation should work with the Industry, but is hampered by outdated rules and regulations, and insufficient people on the ground to interact with farmers in an advisory capacity.

Burn regimes - laws are in place, but there is little co-operation between farmers, Nature Conservation and Fire authorities.

On the plus side, the Industry is in the envious position to have a broad genetic source of new material to bring the world floriculture trade. We need to optimise this opportunity to maintain our competitive edge.

CAN AN ENVIRONMENTAL MANAGEMENT SYSTEM (EMS) REPLACE THE TRADITIONAL PARK MANAGEMENT PLAN?

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To our knowledge, the use of a formal, structured systemic approach to implement, audit and review protected area management activities has never been undertaken anywhere in the world. In May 1999, the Cape Peninsula National Park (CPNP) initiated a GEF-funded project to establish a systemic Environmental

Management System (EMS) for the park based on the International Standards Organisation (ISO) 14001 requirements.

Academics, planners and strategists talk somewhat glibly of the need to implement an Environmental Management System but what is an EMS, what are the much vaunted ISO standards and of what value is an EMS in operational conservation management? Can it meet it's laudable objectives of participation, holism, proactive management, continual improvement, paradigm shifts, preventative management, integration and shared responsibilities or is EMS just another management fad?

This presentation can't explicitly give answers to these vexing questions that have dogged the development of an Integrated EMS (IEMS) for the CPNP. The Park has taken a calculated risk in the development of this IEMS which subsumes the traditional management plan into it's systemic structure and reviews the progress made to date.

The Initial Environmental Review (IER) has been completed and includes a comprehensive Legal Review. Through an extensive public process lasting some 8 months a Park Vision and Policy and a 5-year Strategic Management Plan have been finalised. Progress on the finalisation of the Annual Business Plan and the detailed Procedures and Guidelines will be reported. The use of "legacy" software to integrate the components of the IEMS will also be presented.

We will \provide a short overview of the rationale for, and perceived benefits of, the use of a systemic approach to park management planning, but acknowledge that the proof of the pudding is in the pie!

MANAGEMENT OF GROOTBOS PRIVATE NATURE RESERVE

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Grootbos is a 1050 ha private nature reserve situated between Hermanus and Gansbaai. The reserve was registered in 1996 under the auspices of Cape Nature Conservation and must therefore adhere to certain guidelines put in place by CNC for private nature reserves. One of these is the establishment of a management plan and the implementation of such a plan. The Grootbos management plan was finalised in February 2000 and is based on a detailed vegetation survey as well as other data gathered over the 5 years since the

establishment of the reserve. GIS formed the pivot around which the management plan was developed. The GIS system and management plan are intricately linked and provide the framework around which conservation management takes place on the reserve. The development of the management plan as well as the implementation of management activities at a private nature reserve will be discussed.

An exciting project initiated by Grootbos is the Walker Bay Fynbos Conservancy. Currently the conservancy covers an area of just over 10 000 hectares and is still expanding. We are busy with a survey of the conservancy that will form the baseline for the conservancy management plan. This conservancy management plan will be finished by September 2000. The objectives of the conservancy and the progress with the conservancy management plan will be discussed briefly.

LONG-TERM MANAGEMENT PLANNING IN THE KOGELBERG BIOSPHERE RESERVE

Poster

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The Kogelberg Biosphere Reserve is situated some 60 km south east of Cape Town in the Western Cape Province of South Africa. It spans across 100 000 hectares, including both terrestrial and marine ecosystems, covering terrain from below sea level to the highest peak of 1270 m. Included are vast tracts of natural vegetation, major wetland systems, five towns and various settlements, agricultural lands, commercial plantations and recreational resorts. As far as possible the boundaries of the KBR coincide with ecological boundaries e.g. watersheds, rather than regional planning boundaries.

The KBR was registered with UNESCO under its MAB programme in December 1998. Since the region is only being actively managed as a biosphere reserve for just over a year, the best management system for the KBR is still being finalised. However, all management actions hinge heavily on co-operation from all the stakeholders.

Since the registration of the KBR various projects and programmes have been initiated in the region. This poster highlights the more important ones currently underway and provides a short description of each.

The KBR aims to promote the involvement of all people in the conservation of biodiversity, to the benefit of the entire region. Through the biosphere reserve concept, conservation, wise development and the sustainable utilization of natural resources are successfully combined. The KBR is widely supported by all stakeholders and is showing the road to a brighter, more sustainable future for all its people.

FIRE HISTORY OF THE FYNBOS BIOME: 1987 TO 2000

Poster

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A project has been initiated to map veld fires in natural areas throughout the Fynbos Biome in the Western Cape from LANDSAT images. To date a set of single band (Band 7) LANDSAT 5 TM images have been acquired for each year since the summer of 1996. More precise dates of larger fires, for which no fire records exist, will be obtained from low resolution LANDSAT "thumbnail" images that can be downloaded from the website of the CSIR Satellite Application Centre (SAC). Initial results will be presented.

If the pilot study is successful the mapping can be extended back to 1989 with LANDSAT 5 TM images and from 1987 to 1988 with LANDSAT MSS images that are available from the CSIR Satellite Application Centre (SAC). A set of LANDSAT MSS images covering the period 1982 to 1986 are also archived at SAC but so far attempts to transcribe the data has been unsuccessful.

A CONSERVATION PLAN FOR THE RENOSTERVELD AND SAND PLAIN FYNBOS REMNANTS ON THE WEST AND SOUTH COAST AREAS OF THE CAPE FLORISTIC REGION (CFR)

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Several conservation prioritisation exercises have been conducted in the lowlands of the CFR over the last 20 years. These studies have focussed on CFR lowland conservation in a piece-meal manner and have had limited success in prompting conservation action to improve the conservation of these threatened habitats. This is partly due to the lack of suitable conservation planning tools. The approach adopted in the recent CAPE conservation planning study provides us with a better overall framework in which to approach fine scale conservation planning for the CFR.

Although it is recognised that all remaining areas of Renosterveld and Sand Plain Fynbos are irreplaceable in terms of conservation goals (i.e. stipulated by the International Convention on Biodiversity, South African White Paper on Biodiversity and outcomes of the CAPE project), there is currently no widely implementable mechanism or legislation to secure the conservation of these areas. Further, given the vulnerability of these areas to transformation, it is imperative that a practical and implementable conservation strategy is formulated in order to secure the conservation of the most critical areas as soon as possible.

The aim of this 3–year project is to produce an implementable conservation plan that conserves the unique biodiversity patterns and processes of the region. A systematic conservation planning approach and GIS-based methodology will be used. In addition to scientific robustness, it is critical that the plan has the support from conservation and other land-use implementing agencies. I will present a proposal on the project design for discussion and input.

IMPACT OF AND POSSIBLE MANAGEMENT OPTIONS FOR THE ERADICATION OF SMALLMOUTH BLACKBASS IN CERTAIN RIVERS IN THE CAPE FLORISTIC REGION

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The impact of the North American smallmouth bass *Micropterus dolomieu* in acidic clearwater rivers in the Cape Floristic Region (CFR) was evaluated and certain management options that have been used to eradicate invasive alien fishes elsewhere were assessed for suitability in these waters. Smallmouth bass is recognised as a primary reason for the threatened status of the majority of the CFR's freshwater fishes. The CFR's freshwater ichthyofauna has a high conservation value as 16 of its 19 species are endemic and 15 of these are listed as threatened. Nine species are endangered.

Unfortunately, *M. dolomieu* is present in all major river systems of the CFR and dominates much of the middle and lower reaches of mainstreams as well as several tributaries. Numerous observations confirmed that where *M dolomieu* occurs, small indigenous fish species such as the redfin minnows and juveniles of larger species (e.g. Clanwilliam yellowfish *Barbus capensis*) were totally absent. The eradication of invasive alien fish species worldwide is recognised as a complex, time consuming and expensive exercise. Favourable results have been achieved through the use of a piscicide such as rotenone which has the ability to completely eliminate unwanted fish species.

According to available information, no successful eradication of invasive alien fish species has to date been undertaken in South African rivers despite an urgency for such actions. There is a need to start rehabiliting our rivers by integrating the eradication of invasive vegetation with the eradication of invasive fish species. Cape Nature Conservation is eager to kick-start such an initiative by rehabilitating the Rondegat River in the Cederberg. To achieve this, sufficient funding and the support of key role players is urgently required.

THE AFRICAN BLACK OYSTERCATCHER – (*HAEMATOPUS MOQUINI*) INDICATOR SPECIES FOR OUR COASTLINE

Poster

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The African Black Oystercatcher (*Haematopus moquini*) can be used as an indicator species to gauge the environmental health of our coastline.

Why use Oystercatchers as an indicator species? Because they live permanently on the coastline, adult birds are resident all year round and are very territorial. These birds are totally dependent on the coastline for their survival; feeding, breeding, nesting and roosting all take place along the coast. Their breeding distribution is basically from the Bashee River (old Transkei) to Lüderitz (Namibia). Oystercatchers are also far easier to study than White Fronted Plovers or Whelks therefore far more is known of their biology.

The habitat requirements for Oystercatchers are quite specific. Mixed rocky/ sandy shores, low disturbance factors and abundant shellfish (Black Mussel / White Mussel). Unfortunately the chick-rearing period is the most critical period for the Oystercatcher (October to March breeding season) and coincides with the summer holiday crowds.

During the chick stage the bird is not able to defend itself. Its only defense mechanism is to lay still. 4X4 Vehicles, beach-goers and anglers have direct human disturbances while indirect human disturbances would be uncontrolled dogs, all night fishing, etc. (they allow predators to take eggs or chicks). Natural losses occur by way of nests below high-water, gulls, genets and heat stressed eggs and chicks.

There is however a drawback to Oystercatchers as an indicator species. They are a long-lived bird. The implications of this is that we could have a population of very old birds where no breeding (or very little) is taking place. There could

suddenly be a crash in the population. Aging of Oystercatchers is easiest at the end of the breeding season. Birds of a year or more are difficult to age in the field.

Goukamma Nature and Marine Reserve is an important area for the Oystercatcher. Due to the implementation of a Marine protected Area and certain management actions, the Oystercatcher breeding success has increased steadily over the past 11 years. Outside of this protected area breeding success has also been measured.

The area between Dana Bay and Boggoms Bay shows relatively high numbers of Oystercatchers with a high success rate of breeding. This area is still reasonably undeveloped and human impacts on the coastal zone are relatively low.

Another area monitored was Gerickes Point. Here relatively high numbers of Oystercatchers are counted but the breeding success rate is low. Human impacts such as housing developments, angling, excessive bait collection and shellfish harvesting have a major impact on the Oystercatcher.

Developments along the breeding area coastline will be mirrored by poor Oystercatcher numbers and recruitment. Obviously other species will suffer along with the Oystercatcher!

INFORMATION MANAGEMENT SYSTEMS – MOVING FYNBOS CONSERVATION (RELUCTANTLY) INTO THE DIGITAL AGE

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L Gardner
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"Operational managers do not need a computer to tell them how to do the job" / "Don't worry, I will switch on my super dooper computer and it will tell me everything I need to know".

Somewhere between these two extreme management attitudes lies the pragmatic implementation of an Information Management System to provide reliable and objective decision-support to operational conservation managers. But (and there is always a but) providing digital information to support conservation management assumes sound computer infrastructure, an information management system design, a data management strategy, a database design, user applications, software, data maintenance procedures, data sharing procedures, specialist support, capacity and training ... and therein lies the rub.

This paper presents the progress made by the Cape Peninsula National Park (CPNP) to establish a GIS-based Environmental Information Management System (EIS) and highlights some of the products developed to date. This progress however is contextualised by reviewing the constraints which face the effective implementation of the EIS and identifies possible ways of circumventing these potential logjams.

A short demonstration of a Graphic User Interface (GUI) application (Land Management module) which enables access to the parks GIS database, will be made.

CULTIVATION OF PRIMARY HEALTH CARE PLANTS ASSOCIATED WITH THE FYNBOS REGION

Poster

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The number of people in South Africa using traditional indigenous medicine amounts to approximately 27 million. The reliance on such medicines is partly owing to the high cost of conventional medicine, unemployment and the inaccessibility of modern health care facilities, but also because traditional medicine holds a higher cultural esteem for the users. This resulted in an increased demand for certain popular plant species, exceeding the supply thereof. These species are facing extinction outside protected areas, the biodiversity is under threat, and the health of a large percentage of the population is at stake.

Experience indicated that only conservation that includes direct value to the people functions in the long run and is valued by humans. An approach,

successfully used in overseas countries, is to conserve the germplasm in a gene bank, while communities are developing the threatened plant species for cultivation for own and other use. This practice will protect the plants from extinction, add value to cultivators as a potential source of income, and

contribute to the health of the nation. Communities often have access to small pieces of land, be it in the form of community gardens, school or other urban gardens, which will be big enough to cultivate medicinals. Interested and willing communities can be assisted in knowledge and expertise through technology transfer to become empowered and self-sustaining in the cultivation and conservation of targeted plant species contributing to the primary health of the nation.

THE TRAGEDY OF THE FYNBOS

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"INDIVIDUALISM IS CHERISHED BECAUSE IT PRODUCES FREEDOM. BUT THE GIFT IS CONDITIONAL: THE MORE THE POPULATION EXCEEDS THE CARRYING CAPACITY OF THE ENVIRONMENT, THE MORE FREEDOMS MUST BE GIVEN UP." (Hardin, G 1998 extension of "The tragedy of the Commons" Science Vol 280.)

Most of us are aware of development, its associated threats and the reasons for it in the Fynbos Kingdom. We are also aware of the advances in current thinking and the legislation (some of it the best in the world). Despite legislation and current thinking, we are still failing in our task. There are also pit falls in this current thinking as we bury ourselves under a mound of phases & terms, such as "Strategic Environmental Assessments"; "sustainable development" ; "rare & threatened species" & "search & rescue". Finally, I would like to end of with some of the positive ideas, projects & plans that are occurring in the Fynbos Biome.

DESCRIPTION OF THE VEGETATION IN THE SOUTH CAPE DISTRICT COUNCIL AREA - ITS ROLE TOWARDS SPATIAL FRAMEWORK PLANNING

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The South Cape District Council (SCDC) area stretches from the Bloukrans River in the east to the Breede River in the west, from the coast line, inland to the Langeberg and Outeniqua mountain ranges in the North. This area has been divided into three regions, the Outeniqua, Mossel Bay and Langeberg regions. A representative portion of the study area has been selected for the purposes of this presentation. A combination of Bio-regional and development planning approaches have been followed. Vegetation, although one of the many facets that contribute to the Bio-regional approach, forms the basis of the identification of core areas. The vegetation *status quo* was obtained by mapping vegetation units using 1:10 000 orthophotographs and existing aerial photography. The natural vegetation present in the study area is mostly found in proclaimed nature reserves, along a thin coastal strip, the mountain ranges in the North and the river valleys throughout the region. The remainder of the area consists of intensive cultivation, afforestation, grazing and areas where development has already taken place. Ground-truthing and selective quantitative data collection has been used to identify additional potential core and buffer areas. Vegetation types formed the basis for allocating Vegetation Sensitivity - ranging from very high to low sensitivity areas. The Vegetation Sensitivity is then combined with other biophysical data to create an Environmental Sensitivity Map, which together with social, engineering and planning aspects, is used in creating the Spatial Development Framework Plan.

PLANNING FOR VISITORS TO THE CAPE PENINSULA NATIONAL PARK

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Various initiatives are underway in the CPNP to address the question of visitor management in an open access system and the provision of facilities required to do this.

The presentation focuses on three projects to address this challenge:

1. The Visitor and User survey – a year long, comprehensive survey to determine the number of visitors to the CPNP and their attitudes – there are 4.5 million visits per year to the CPNP and the priority facilities identified are clean toilets and safe parking!

2. The Conservation Development Framework for the CPNP – the new spatial planning framework to guide conservation and development initiatives in the CPNP – revisits the "Use Zone Maps" and the idea of "gateways" as a means of channeling visitors to the Park.

3. Local area planning initiatives at such historic sites as Groote Schuur Estate, Constantia Nek, the Glen, van Riebeek Park – all high intensity use areas dense with historic alien trees but considered to be part of the "cultural landscape" – what future role do these sites play in the CPNP?

The presentation addresses these and other controversies.

THE IMPACT OF GROUNDWATER ABSTRACTION ON SPRINGS IN THE KAMMANASSIE MOUNTAIN

Poster

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The Klein Karoo Rural Water Supply Scheme (KKRWSS) utilises groundwater to supply Dysselsdorp and the rural communities between Dysselsdorp and Calitzdorp with water, as well as drinking water for livestock.

The Scheme is the property of the Department of Water Affairs and Forestry (DWAF), with Overberg Water appointed to manage the Scheme according to DWAF guidelines. The Scheme was completed in 1993 and abstraction commenced the same year.

Four pumpholes are situated on Stateland and fall within the Kammanassie Nature Reserve, which is under the control of the Western Cape Nature Conservation Board (WCNCB). A further one pumphole is situated within Declared Private Catchment.

During the first year of the Scheme a total of 1,183 million m^3 of water was abstracted. Annual abstraction for 1998 was a total of 1,075 million m^3, the water table has dropped 20m.

Spring monitoring by Kammanassie Nature Reserve staff showed that during February 1999 out of a total of 37 springs, 24 were dry and 13 were flowing. Of these a total of 9 had dried up before the KKRWSS begun and a total of 10 had dried up since. During February 2000 follow-up monitoring of the springs took place. Out of 47 springs monitored, 30 were dry and 17 were flowing. A total of 7 springs had dried up within one year.

The Kammanassie Mountain relies on spring water to function effectively. The population of 37 Cape Mountain Zebra relies on these springs for drinking water and survival. Farmers situated around the Kammanassie Mountain also

rely on spring water from the mountain for drinking water, water for stock and use on their farms.

The impact of large-scale groundwater abstraction is having an effect on springs on the Kammanassie Mountain.

DOES ALIEN VEGETATION BURN WITH GREATER SEVERITY THAN FYNBOS, AND HOW DOES FIRE SEVERITY INFLUENCE CATCHMENT STABILITY?

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A severe fire in the Brakkloofrant mountains, above Fish Hoek, on the Cape Peninsula in March 1999 was followed by a storm on 21 April 1999 which resulted in unusually high sediment runoff from the mountain, including mudslides through residential areas. Peninsula fires of January 2000 were the largest in recorded history. In response to these events, this study aims to test whether soil erosion and fire severity was related to vegetation types.

Does sediment run-off differ between catchments covered with alien vegetation and fynbos catchments? Provisional results indicated that soil erosion was greater on slopes covered with alien vegetation, and less on fynbos catchments. However, geological type, especially mobile sand, showed high levels of sediment run-off, irrespective of vegetation type.

The mechanism whereby alien vegetation may increase post fire soil erosion is generally related to the severe fires and high fuel loads associated with alien vegetation. Severe fires at the soil surface can scorch the leaf litter, humus and organic roots in the soil, leaving surface soils loose and more susceptible to erosion. Indigenous fynbos vegetation typically has a much lower fuel load,

and the flammable leaf litter on the surface is, relative to that of alien vegetation, very small. A more severe fire has been shown to induce a water repellent layer below the charred surface soil. This increases the likelihood for the ashed, non-repellent material, situated above the repellent layer to wash off in high rainfall events (once the surface material becomes saturated). Further, the large volume of organic material associated with alien stands (which is ashed in a severe fire), results in a much higher volume of erodable material being produced by the fire. The potential for a high volume of ashed suface material, associated with fires in alien vegetation, is what distinguishes mudslides from surface runoff.

A FRAMEWORK FOR A STRATEGIC AND SYSTEMIC CONSERVATION PLAN FOR THE CAPE FLORAL KINGDOM: AN OUTCOME OF THE CAPE PROJECT

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Systematic conservation planning is a branch of conservation biology that seeks to identify spatially explicit options for the preservation of biodiversity. Alternative systems of conservation areas are predictions about effective ways of promoting the persistence of biodiversity; therefore, they should consider not only biodiversity pattern but also the ecological and evolutionary processes that maintain and generate species. Most research and application, however, has focused on pattern representation only. This paper outlines the development of a conservation system designed to preserve biodiversity pattern and process in the context of a rapidly changing environment. The study is an outcome of the Global Environmental Facility-funded Cape Action Plan for the Environment (CAPE) Project.

The paper develops the plan by systematically considering all of the steps in a planning protocol. First we assess the current and future threats to biodiversity second we set explicit conservation targets for biodiversity patterns and processes; third we evaluate the effectiveness of the existing reserve system in terms of these targets; fourth we outline procedures for identifying an expanded

system of conservation areas to achieve reservation targets; fifth and finally, we discuss the issues to be addressed in implementing and maintaining the whole system.

We emphasize the importance of setting conservation targets for the spatial components (or surrogates) of ecological and evolutionary processes. We present examples of how evolutionary processes can be incorporated into systematic conservation planning to foster the maintenance and generation of biodiversity in the CFR. We also discuss the difficulty of assessing the requirements for pattern versus process representation in the face of ongoing threats to biodiversity, and the difficulty of testing the predictions of alternative conservation systems.

THE CAPE STRATEGY DEVELOPED FOR THE CONSERVATION OF THE CAPE FLORISTIC KINGDOM

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The Cape Action Plan for the Environment, or CAPE, is a two-year project that aims to develop a strategic plan for the conservation of biodiversity in the Cape Floral Kingdom. The strategy for CAPE, builds on the situation assessment presented at the last fynbos forum and forms the basis for the development of the more detailed implementation programme and business plans which were developed in consultation with implementation agencies. The emphasis CAPE places on the development of a coherent strategy is in line with recent trends in international finance. There has been a change in the approach to the funding of conservation from the funding of *ad hoc* projects to the funding of well-conceived projects linked to an overall goal-directed strategy.

The goal for CAPE is:

By the year 2020, the natural environment and biodiversity of the Cape Floral Kingdom are effectively conserved, restored wherever appropriate, and delivering significant benefits to the people of the region, in a way that is embraced by local communities, endorsed by government and recognised internationally.

The strategy for CAPE outlines the intermediate objectives that have to be reached in order to attain this goal. It is structured into eight broad themes. These were derived from the situation assessment and strategy development process. Three of the themes are cross-cutting, and five are sector-specific themes.

The cross-cutting themes are:

- Strengthening institutions
- Enhancing co-operative governance
- Promoting community involvement.

The sector-specific themes are:

- Strengthening on and off-reserve conservation
- Conserving biodiversity and natural resources in catchments
- Supporting integrated land-use planning
- Improving the sustainability of resource use
- Promoting sustainable nature-based tourism.

It must be emphasised that strategy development is an iterative and ongoing process and has already involved broad collaboration through workshops and questionnaires. This strategy should therefore be seen as living document open to ongoing re-evaluation and revision.

IMPLEMENTATION PROGRAMME FOR CAPE

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This talk will cover recent progress in the final stages of the CAPE project, aimed at the development of an implementation and investment programme. The talk will describe the report that will go forward to the CAPE Conference in September 2000, where potential funders will be able to assess potential projects for funding.

The following will be covered:

1. The establishment of a Working Group to oversee the final stages of project selection, and to agree upon structures to take the process into the future after September.
2. An overview of the proposed institutional arrangements for the future governance of CAPE-related activities.
3. The development of an implementation programme, and an overview of the projects selected for inclusion in the final report.
4. An overview of the financial requirements associated with the portfolio of projects, including an assessment of local contributions and additional funding required.
5. An assessment of the alignment of projects with national priorities.
6. An overview of the next steps in the process leading up to the September conference.

ALIEN ERADICATION IN THE CAPE PENINSULA NATIONAL PARK

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The Cape Peninsula National Park is presently engaged in an intensive alien plant eradication program aimed at removing all mature stands of invasive woody alien plants in the park within 5 years.

Using commercial contractors in an open quotation system to do the work, the program is aimed at addressing both conservation and social issues in the area.

The paper reviews the past two years of operation and focuses on the practical considerations and lessons learnt, as well as the challenges ahead.

was popularized. The high diversity of species in the Cape fynbos prompted efforts to develop a structural classification that was not so dependent on species recognition. Although there is some merit in this approach, a florisitic approach is much more powerful. The value of floristic surveys is discussed as a

basis for classification of the vegetation of the Fynbos Biome. The development of the VEGMAP database and map is viewed as important for identifying gaps in our knowledge about vegetation types in the Fynbos Biome and their conservation. To date 4340 relevés from 32 contributors in the the Fynbos Biome have been captured electronically. Between 500 and 1000 relevés remain to be captured.

PROTEA ATLASSING FOR THE FUTURE

Poster

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The Protea Atlas Project has involved many amateurs and professionals in recording where proteas occur on the subcontinent. At present about 200000 records from 45000 localities have been processed. These data are available for those who want to answer research or managment questions. Data are being shared with Cape Nature and National Parks board for managment and EIA evaluation and should soon be part of reserve managers toolkits. Data of Red Data Book species are being evaluated for the new Red Data Lists. However, it is in the research arenas that the most exiciting developements are taking place.

- Are species distribution patterns fractual and over what scales does this hold?
- Is it possible to predict fine scale pattern from coarse scale data - this is a burning issue worldwide, where lots of data exist at various coarse scales - usually at between 10X10km or 1:50 000 scale - giving computing power nowadays, can we interpolate to a finer scale: Few databases worldwide have the resolution (500m) of the Protea Atlas data and a joint South Africa-USA project is being drafted for funding
- Are Fynbos species really a Pleistocene phenomena? This is the current dogma, but is it true? Phylogeny of the Proteaceae could help to answer this issue, but it appears to have dredged up another issue -
- Could the dominant mode of speciation in the Cape be by hybridization? In which case natural hybrids may be a key conservation issue for process driven long-term management.

There is no doubt that the biogeography of the Fynbos Biome will be rewritten based on the data available from the Protea Atlas Project. If you want to use the data for your research, then please contact us.

THE CERTIFICATION OF AQUEOUS SMOKE EXTRACTS USED IN RESTORATION PROJECTS

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It is well known that smoke and aqueous smoke extracts promote the germination of certain seeds. This has a great practical implication for restoration in fire prone areas like the Cape fynbos. The aqueous smoke extract (more commonly known as smoke water) can be used in restoration projects to enable seed to germinate faster and a bigger diversity of plants can be established. Smoke water is made using different methods and different plant material. This inevitably results in different concentrations of smoke water. All the smoke waters do give an enhancing effect on germination. This was tested for Grand Rapids lettuce seed. A too strong concentration of smoke water can damage the seed and a too weak concentration will have no enhancing effect on germination. The concentration needed to stimulate germination in fynbos seed was determined using a standard aqueous smoke extract (the first aqueous smoke extract ever made). By comparing the different smoke waters to the standard, using germination experiments, it can be determined how much stronger or weaker the tested smoke water is. The correct concentration for any smoke water can then be determined. Constant results can then be expected. Money and time will also be saved, because the concentration will not damage the seed and seeds will be stimulated to germinate.

DESCRIPTION AND ANALYSIS OF THE RIPARIAN VEGETATION OF THE HOTTENTOTS-HOLLAND MOUNTAINS

Poster

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The Hottentots-Holland Mountain range is the area in the Western Cape which receives the highest rainfall and it has an extensive river network. Five different rivers originate here: the Eerste, Berg, Riviersonderend, Palmiet and Lourens Rivers. The riparian vegetation types of these rivers have been described and classified into 23 different communities. The main vegetation pattern differs in every catchment. The gradient across the river bank follows a pattern of Wet Bank, Lower Dynamic, Shrub/Tree and Back Dynamic Zones. The vegetation zones furthest from the river are inundated only by rare flooding events, while the Wet Bank Zone is inundated regularly during the wet season.

VULNERABILITY OF THE PLANT BIODIVERSITY OF THE FYNBOS AND SUCCULENT KAROO BIOMES TO PROJECTED CLIMATE CHANGE

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Several climate change scenarios were applied to the vegetation and selected floristic units of the Fynbos and Succulent Karoo Biomes. A bioclimatic approach was used that incorporated five relatively independent climatically derived parameters we consider critical to plant establishment, physiological function and survival. These are minimum temperature, heat units, annual potential evaporation, winter soil moisture days and summer soil moisture days. Spatial resolution of the analysis was 1x1 minute and time span corresponded to a doubling of CO_2 concentration.

Results at the biome level are particularly disconcerting for the unique and immensely species-rich Succulent Karoo biome, which disappears almost completely from its current range on the western coastal and inland plant, with a relocation to the southern Cape (highly unlikely given the need to cross the Cape Fold mountains and many disturbed and transformed landscapes with different geologies and soil types). This change alone threatens to eliminate a sizable portion of South Africa's succulent plant diversity. A national analysis of centres of plant endemism indicates that the Knersvlakte Centre may be worst affected in all scenarios used. This centre is situated within the Succulent Karoo Biome and contains at least 150 species/infraspecific taxa and is particularly rich in dwarf succulents with at least seven succulent genera endemic or near-endemic. Bioclimatic application at the individual species level shows a more complex picture of potential future plant composition in this biome. While the existing areal extent of a number of common species may be drastically reduced with climate change there are other common species that are indicated to survive depending on the scenario used. The rich assemblage of species with narrower tolerance limits in the Succulent Karoo Biome may be expected to be more adversely affected by climate change than the group of generalists.

Results for the Fynbos Biome at the biome level show the retention of a significant portion of its current extent, due to buffering afforded by steep and extended altitudinal gradients. Species level results also indicate that many widely spread species in the biome may be able to survive the projected climate changes but often in reduced area. However, the Fynbos Biome is very rich in species so that any change in its boundaries is likely to cause substantial loss. For example, the Biome's northern arm is particularly threatened by climate change and contains many unique species. Detailed analysis of the possible consequences of climate changes on the many endemics (at least 5000) of this biome requires intensive individual study of their biology and development of appropriate methods. The high proportion of non-resprouters and species sensitive to changes in the fire regime and mutualist collapse could lead to many extinctions with climate change.

The approach used contains many assumptions. Although it is possible that changing some of these assumptions may soften the deleterious effects predicted for both Succulent Karoo and Fynbos Biomes with climate change, it is unlikely to change the broad trends suggested in this paper. Some strategies are suggested for adapting to the expected impacts.

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